Current Capabilities & Programme

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SNOLAB

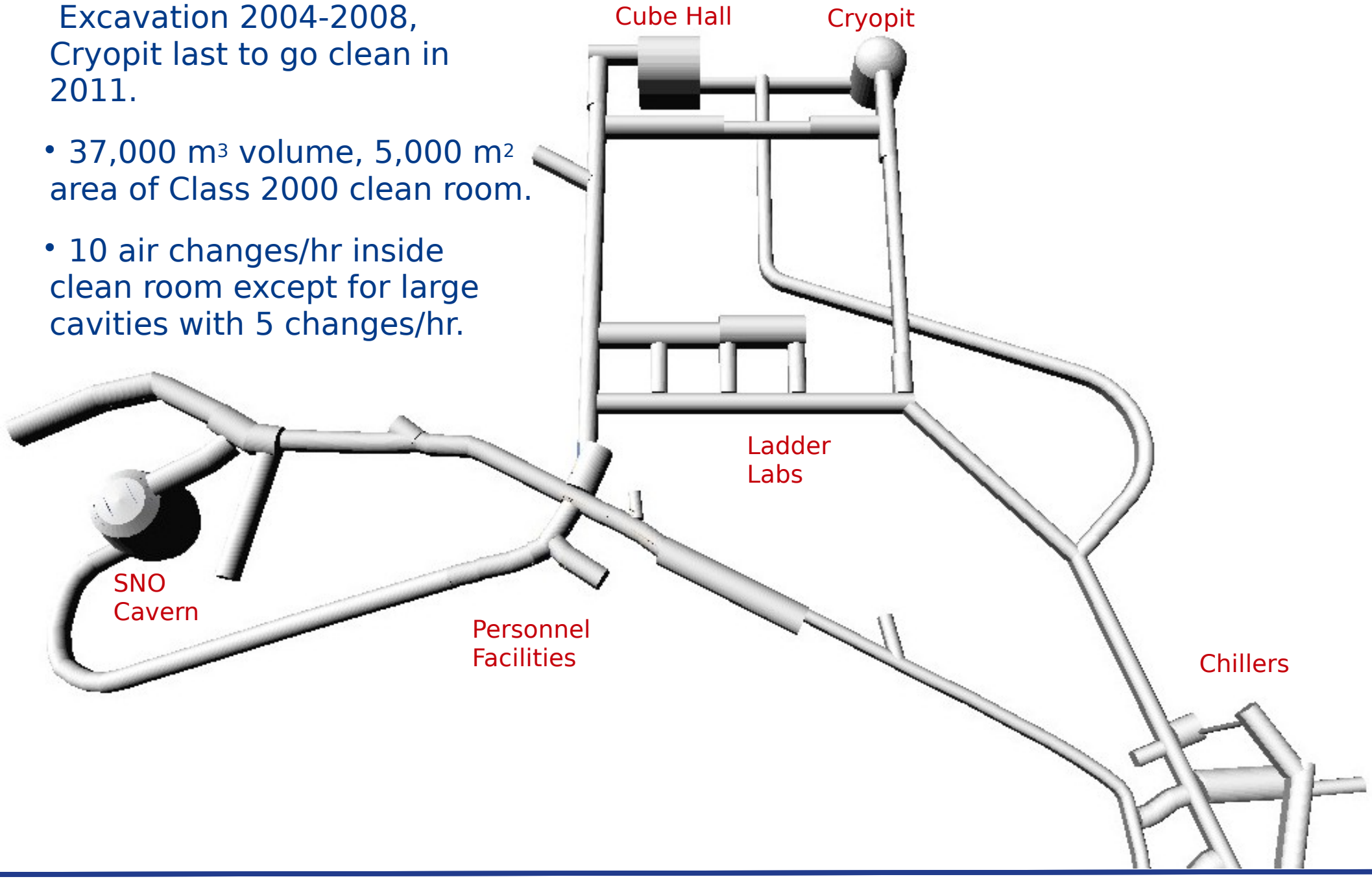
Town Hall
April 1, 2016

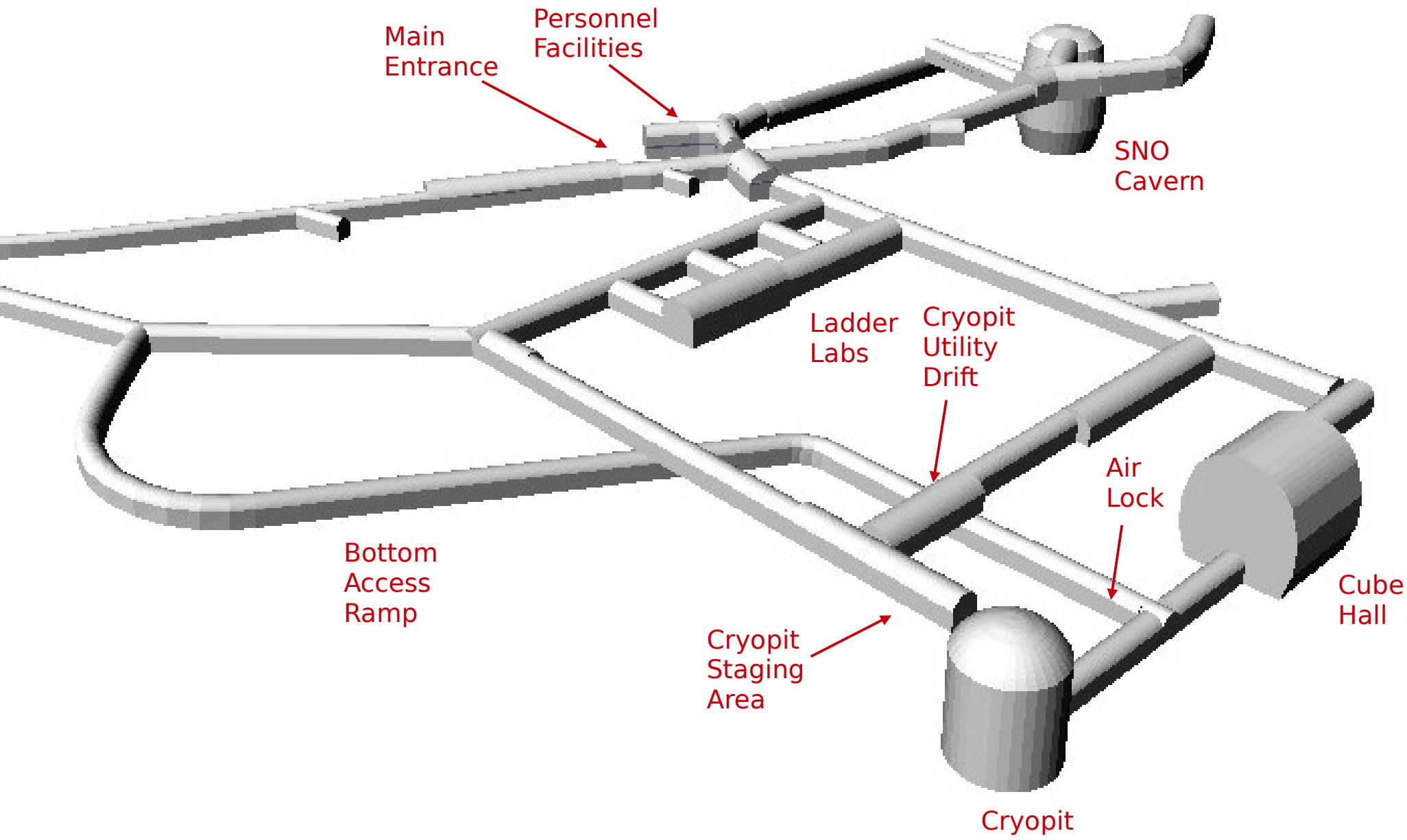

SNOLAB
Facility

The Laboratory

Excavation 2004-2008, Cryopit last to go clean in 2011.

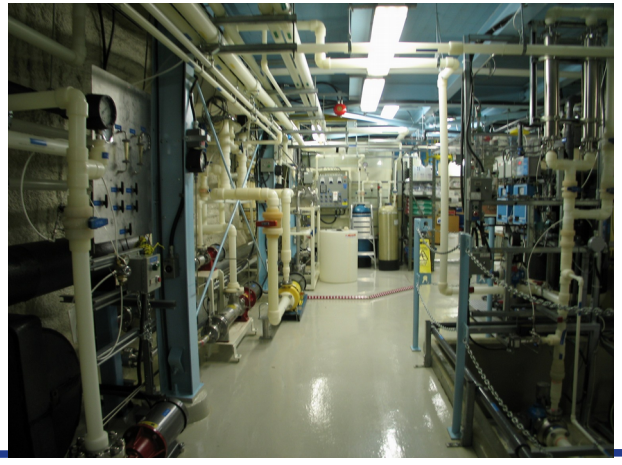
- 37,000 m^3 volume, 5,000 m^2 area of Class 2000 clean room.
- 10 air changes/hr inside clean room except for large cavities with 5 changes/hr.




Main
Entrance
Personnel
Facilities
SNO
Cavern
Ladder
Labs
Cryopit
Utility
Drift
Air
Lock
Bottom
Access
Ramp
Cube
Hall
Cryopit
Staging
Area
Cryopit

SNOLAB Services

- Power (3MW total capacity)
- Cooling (1 MW total capacity)
- Ultra Pure Water (feed stock only, local purification by Project)
- Network (10 Gb/s ug-surface, 1 Gb/s surface-offsite)
- Radon reduced air: ~ 100cfm for short periods
- Exhaust Ventilation (Project specific)



SNOLAB Facilities

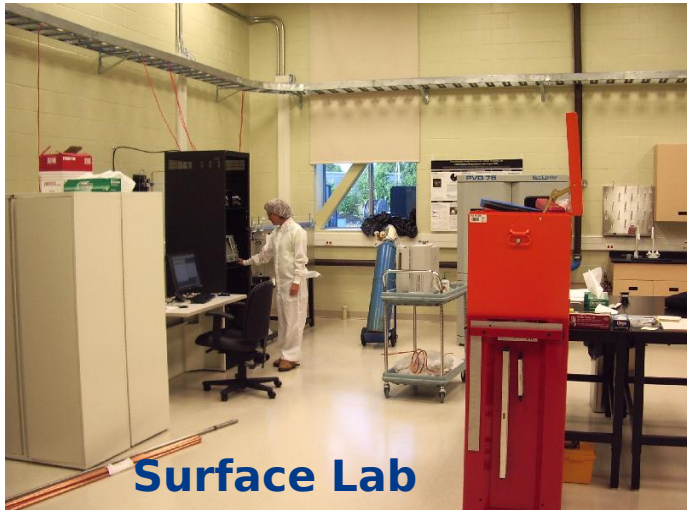
UG Low Background Counting Lab (under development)

Need for Radon-reduced air for low background counting and other purposes?

Surface Machine shop

(not shown)

Surface Lab @LU

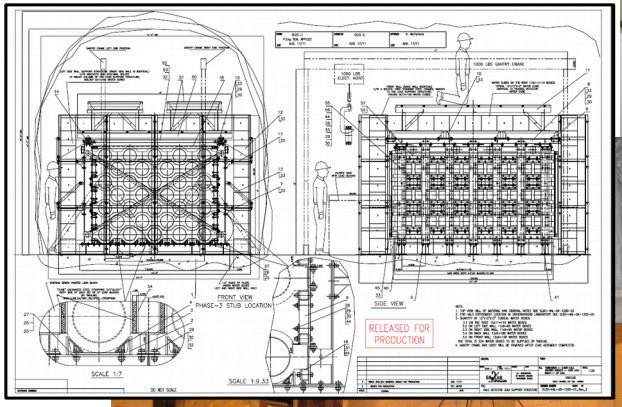


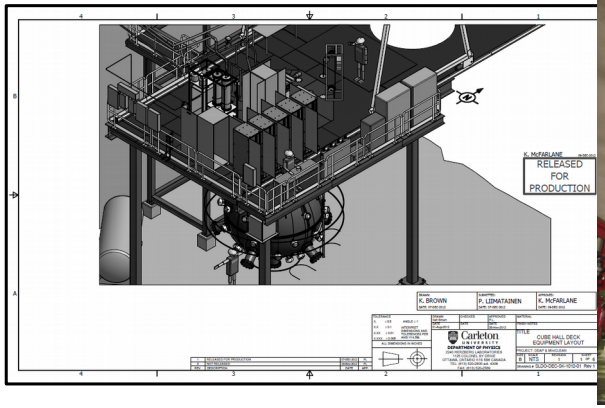
Surface Lab

UG Machine Shop

Experiment Support

- Logistics & Material Handling
- Cleaning
- Installation
- Analytical Services
- IT
- Procurement
- Training
- Design
- Project Coordination
- Radioactive source review (SNOLAB + Community)





Improving Reliability

- Until now SNOLAB has been focused on completion of the laboratory and launching the experimental programme. As a result performance of some key laboratory systems has had limited attention.
- Each experiment has different needs to operate with minimal disruptions. The services that are critical for operations usually include:
  - Power
  - Cooling
  - Network ug-surface and surface- offsite
- Some experiments are particularly vulnerable to loss of power or cooling and may require weeks to recover from a disruption lasting 10s of minutes.

Continuous Network Improvements

Going to single mode fibre (increased bandwith to >=10 Gb/s ug-surface)

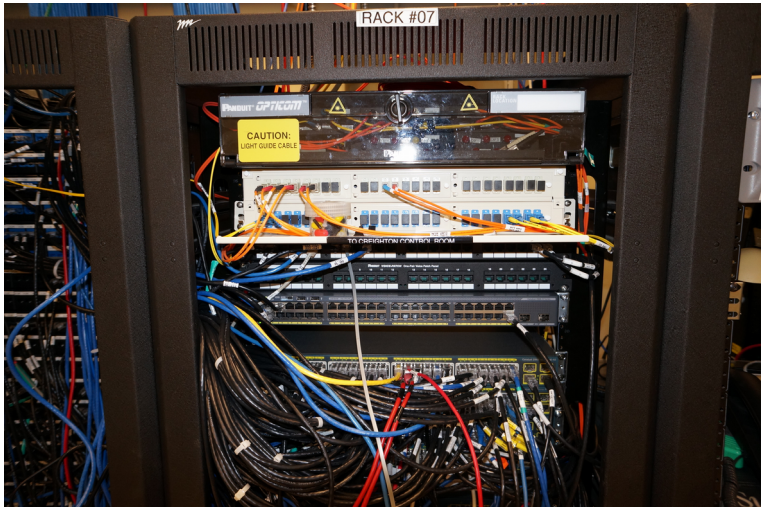
Redundancy across separate fibre bundles in the shaft and drift (albeit at 100 Mb/s).

Additional single mode fibre bundle in shaft planned.

Increased run time on some UPSs underground.

Spanning tree protection in place (but a sufficiently complicated network added to ours can still cause problems)

VPN system priority for 2016



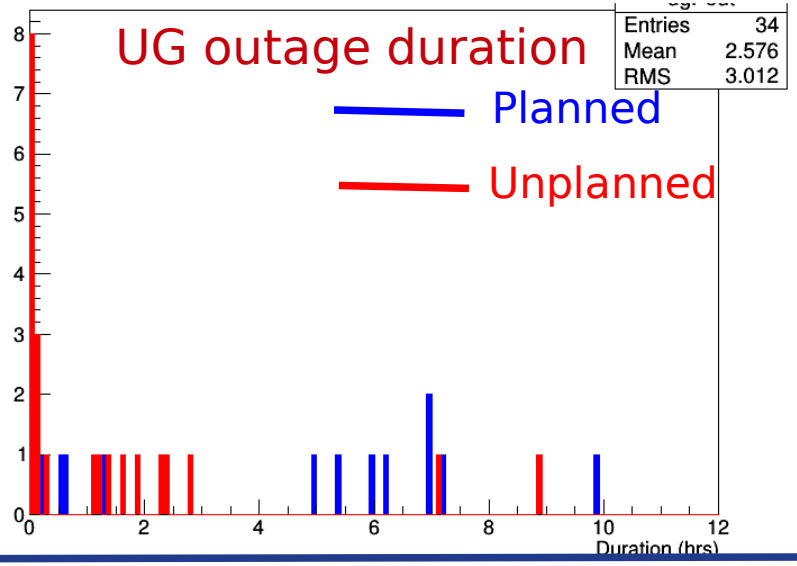
Improving Power

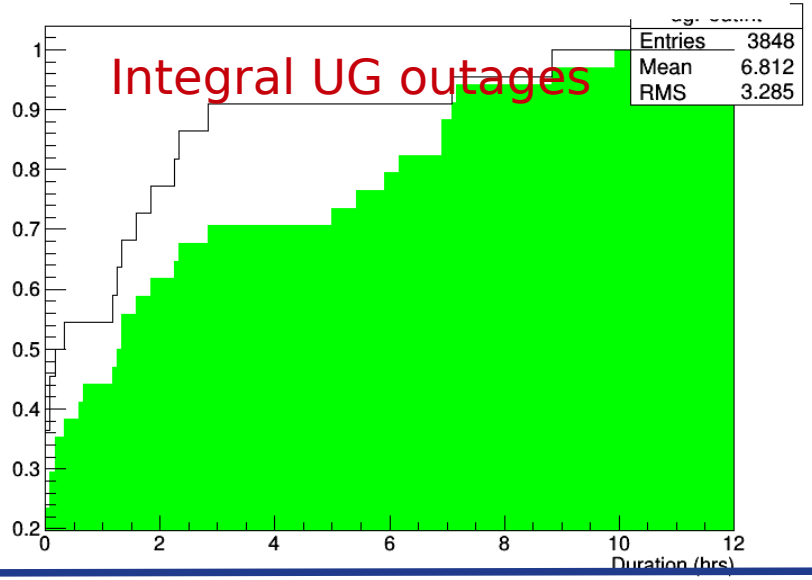
SNOLAB has been seeing an unprecedented number of power outages over the last several years. A majority of these have been due to maintenance and upgrades to the power distribution by both SNOLAB and Vale.

Some of the sources of disruption have been retired through power system upgrades completed in 2015.

Time	Events	Rate (yr^{-1})
< 10 min	11	3.9
> 10 min	23	8.2
> 30 min	21	7.1
> 1 hr	19	6.8
> 2 hr	13	4.6
> 4 hr	10	3.6
> 8 hr	2	0.7
Total	34	12.1

Dec 2011 – Sep 2014





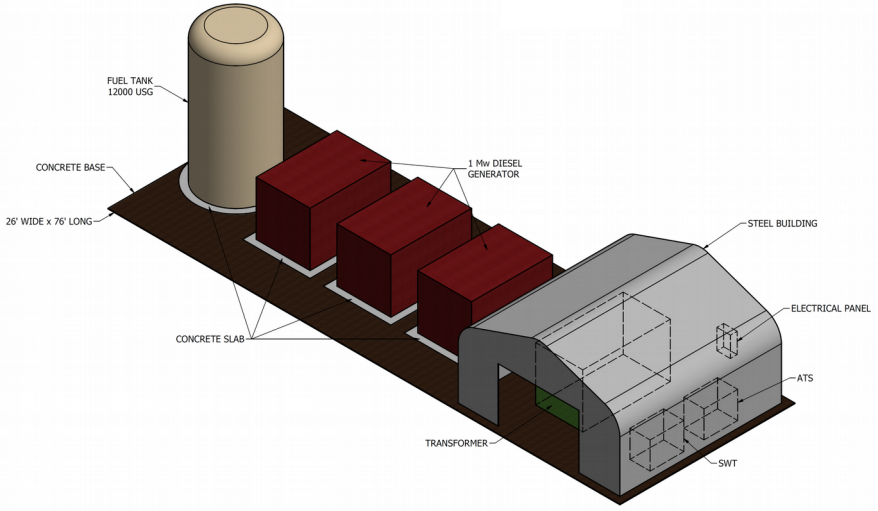
Power will be improved

SNOLAB power will move from Vale #11 Circuit to #18 Circuit while retaining #11 as a backup. (Installation this spring.)

SNOLAB will install a surface generator set:

- Will serve entire u/g lab
- Will require project-specific bridging UPSs
- Automatic transfer in planned and unplanned outages
- Operational in 2018

These actions are expected to decrease the frequency of power disruptions from 12/yr to **1-2** per year.



The Generator on its own is not enough

Implement a preventative maintenance programme and acquire shelf spares of key components.

Improving power redundancy to Chiller.

Considering options for dedicated power feed to SNOLAB from surface.

Experiment design: Considering dual power feeds from the two main distributions within SNOLAB.

Improving Cooling

- The existing Chiller is modular and in principle has a great deal of redundancy in its design. However, there are a number of single point failures that have not been resolved since it was installed.
- Presently there are no statistics on Chiller reliability but it is planned to start collecting them.
- Over the next several years, effort will be made to identify and eliminate these failure points.
- Depending on the success of the Chiller robustness initiative it may still be recommended that high risk Projects implement backup cooling strategies.

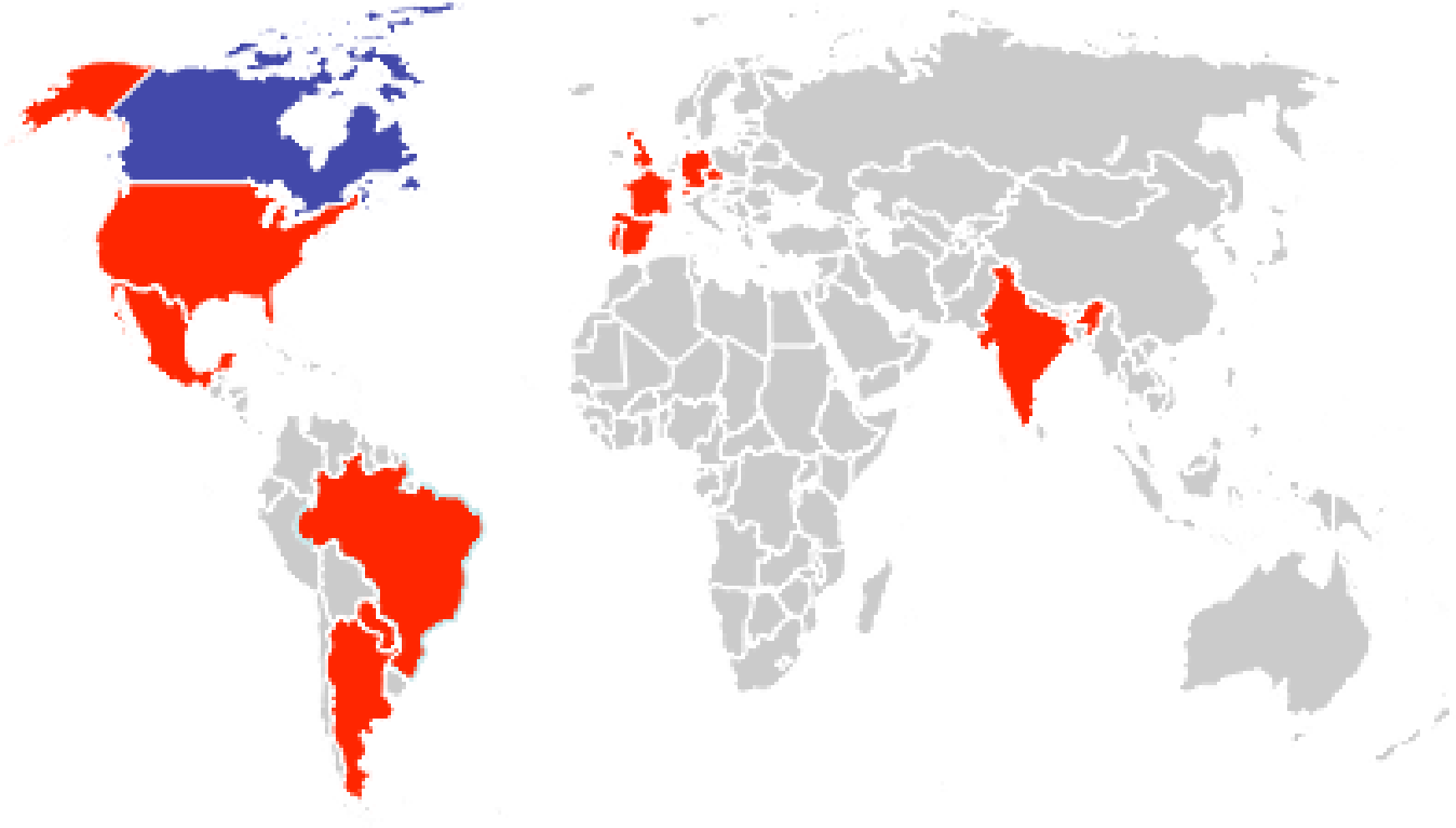
SNOLAB Scientific Programme

Current Science Program

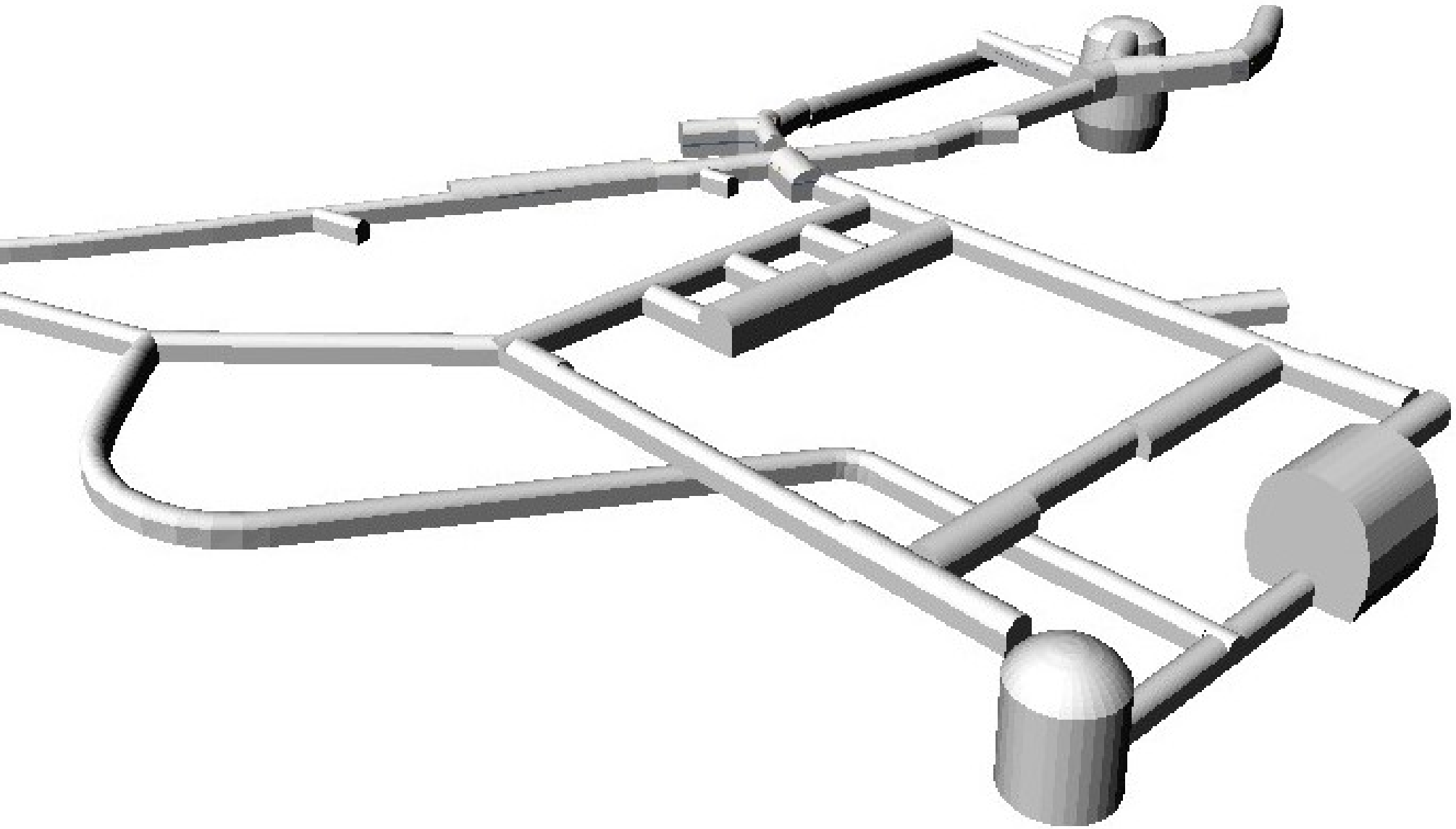
Experiment	Neutrino	Dark Matter	Other	Space Allocated	Satus
CEMI			Mining Data Centre	Surface Facility	**Operational**
COUPP-4		X		J-Drift	Completed
DAMIC		X		J-Drift	**Operational**
DEAP-1		X		J-Drift	Completed
DEAP-3600		X		Cube Hall	**Commissioning**
DEAP- 50T/CLEAN		X		Cube Hall	Expression of Interest
DMTPC		X		Ladder Labs	Expression of Interest
Ge-1T	X			Cryopit	Definition Phase
nEXO	X			Cryopit	Definition Phase
HALO	X			HALO Stub	**Operational**
MiniCLEAN		X		Cube Hall	**Commissioning**
NEWS		X		Cryopit?	Definition Phase
PICASSO-III		X		Ladder Labs	Completed
PICO-2L		X		J-Drift	**Operational**
PICO-60		X		Ladder Labs	**Operational**
PICO-500		X		Ladder Labs	Expression of Interest
PUPS			Seismicity	Various	Completed
SNO+	X			SNO Cavern	**In Construction**
SuperCDMS		X		Ladder Labs	**In Preparation**
Stress Test Biology			Genomics	External Drifts	**Operational**
REPAIR			Low Rad Biology	Ladder Labs	**Operational**
CUTE		X	Test Facility	TBD	Definition Phase
DUST			Test Facility	Ladder Labs	Expression of Interest

The SNOLAB Community

- 149 faculty researchers from 70 institutions over 14 countries
- > 500 faculty, highly qualified personnel and technical support.
- ~11,000 underground person-shifts per year (~60/shift/day).

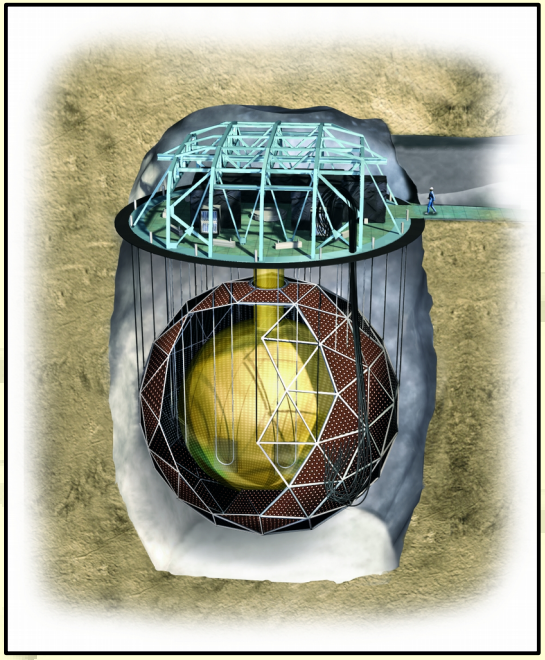


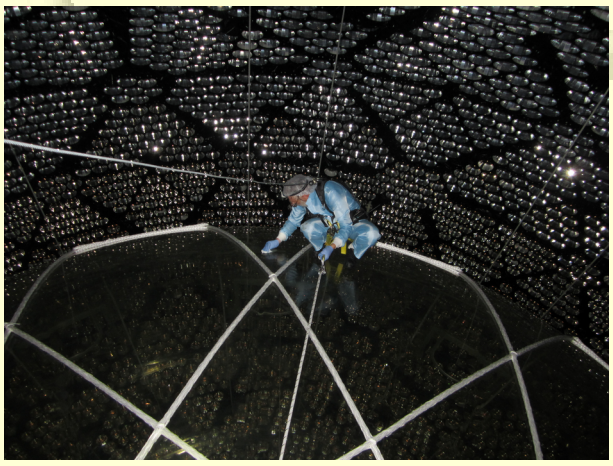
Current Experiments



Current Experiments

SNO+



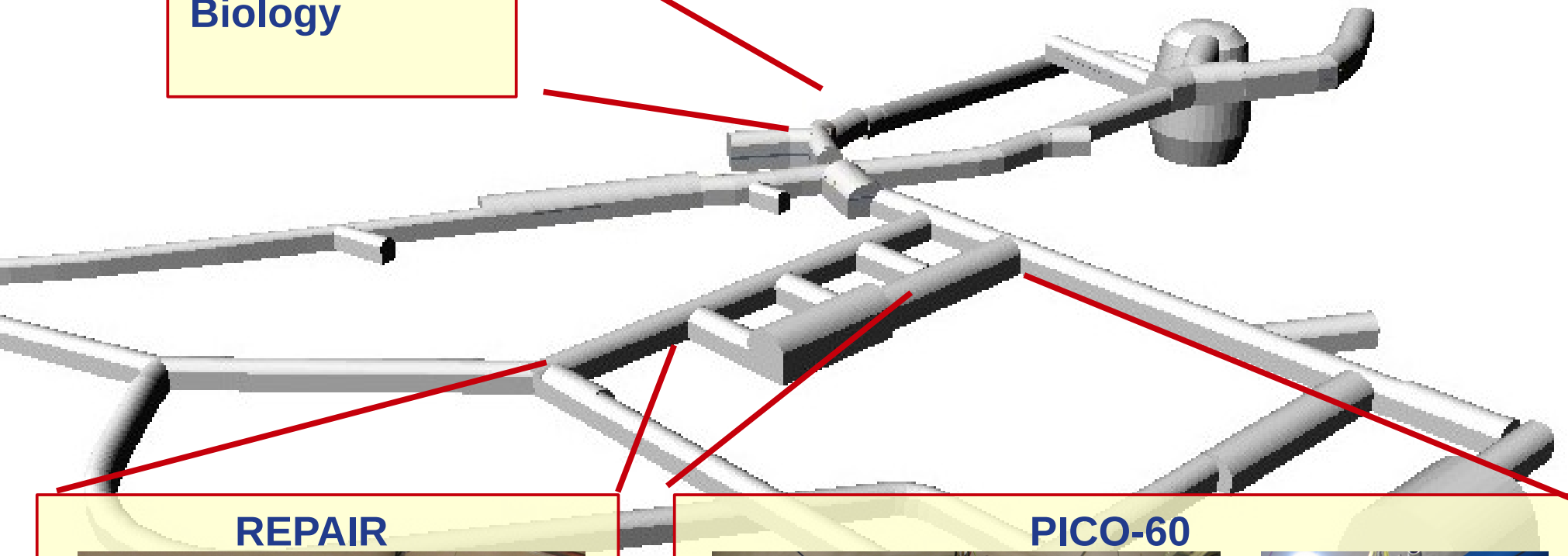


Current Experiments

DEAP-3600, MiniCLEAN

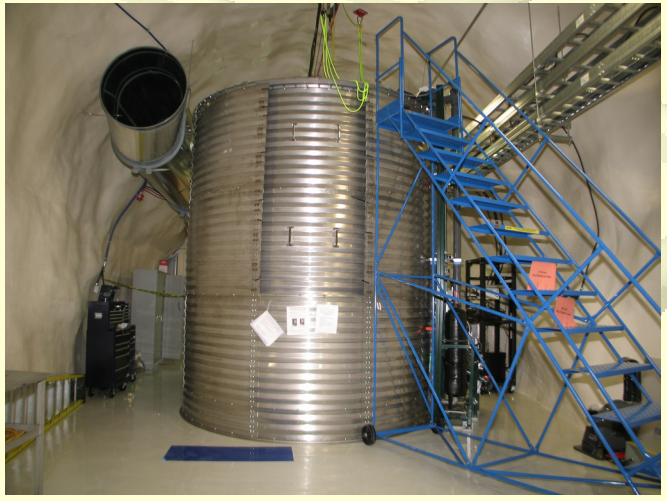
Current Experiments

Pressure Stress Biology



REPAIR

PICO-60



Current Experiments

HALO

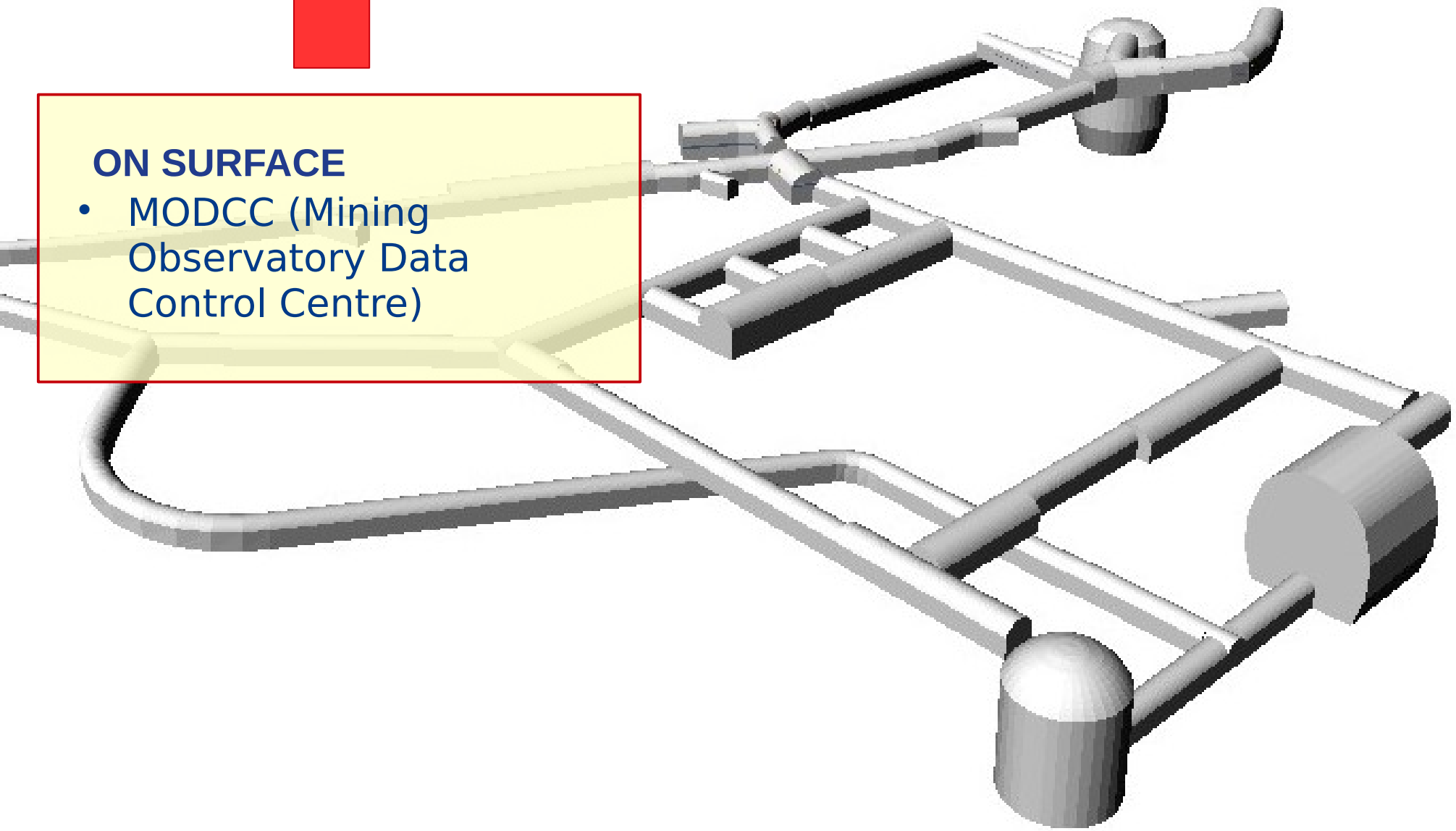
PICO-2L

DAMIC

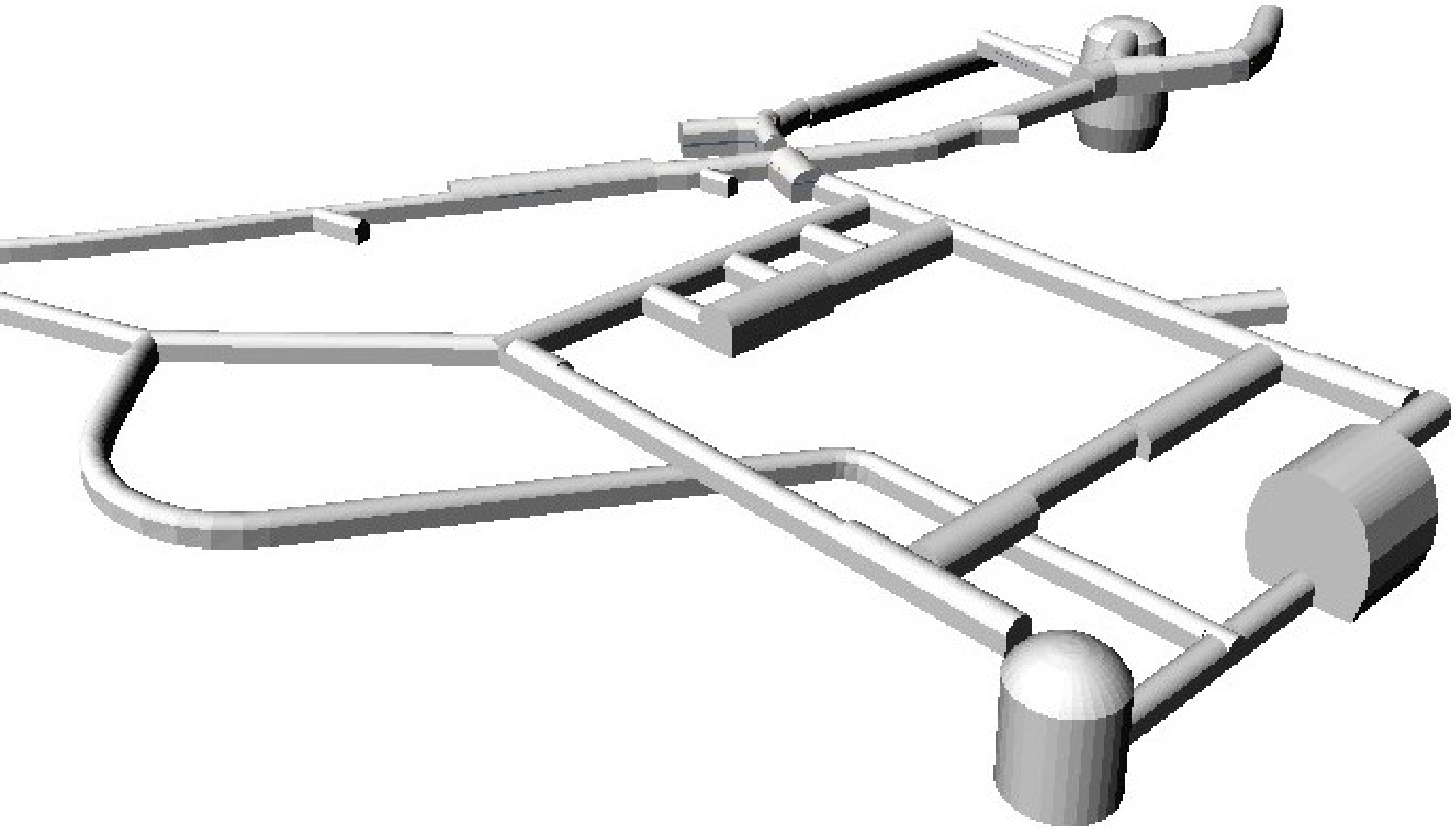
Current Experiments

ON SURFACE

- MODCC (Mining Observatory Data Control Centre)

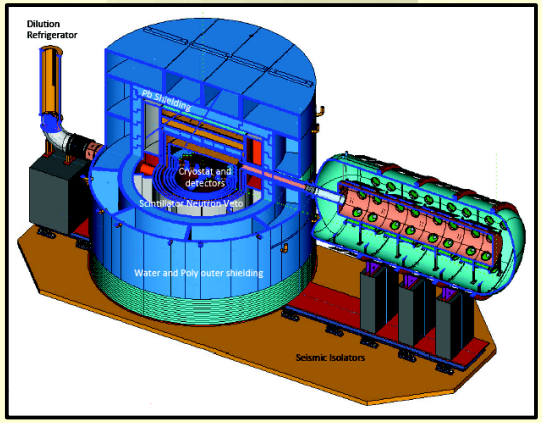


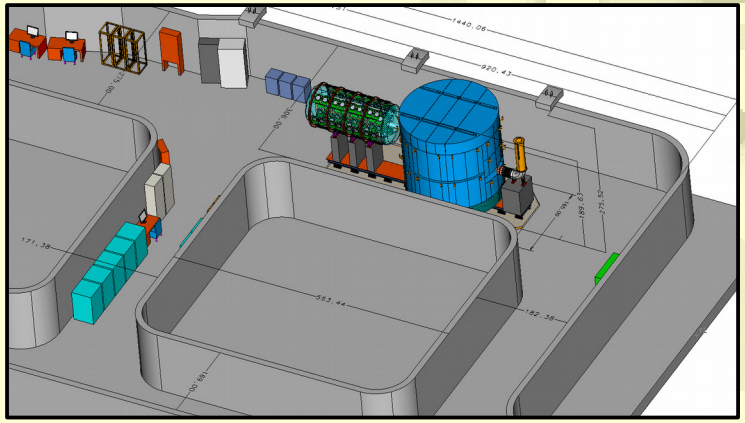
Near Future Experiments



Near Future Experiments

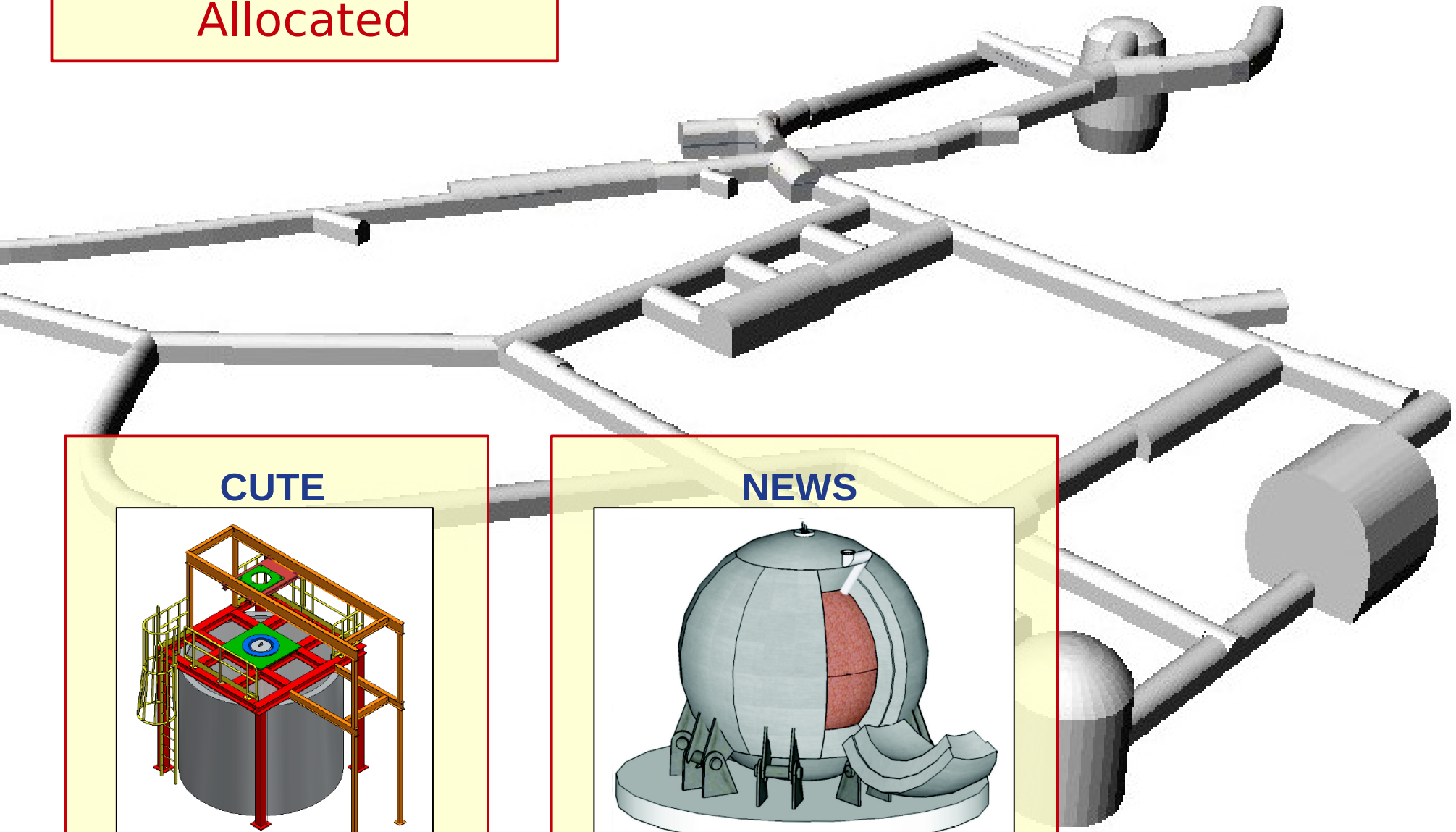
SuperCDMS





Near Future Experiments

Space not yet Allocated

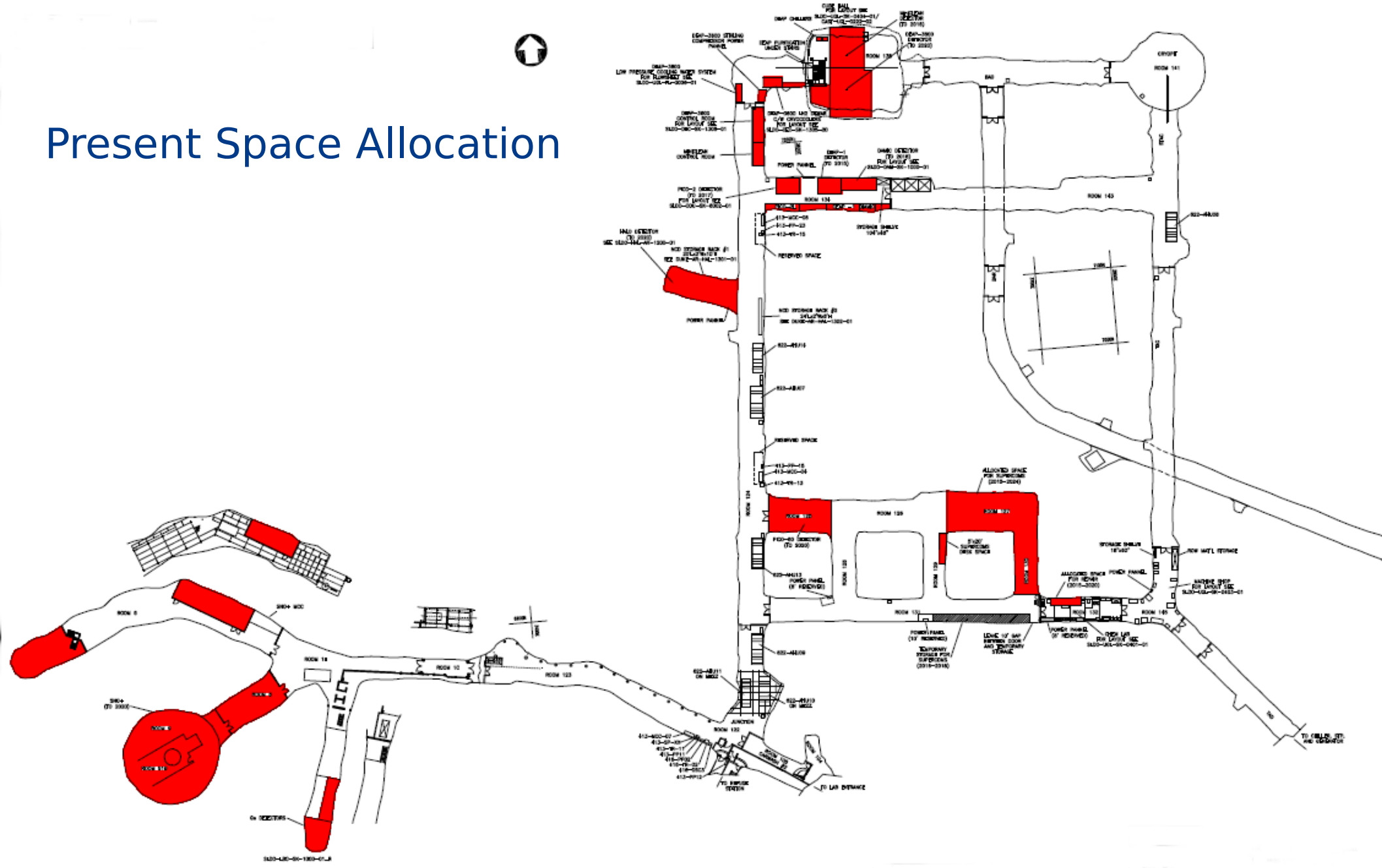


CUTE

NEWS

Space Allocation

Present Space Allocation

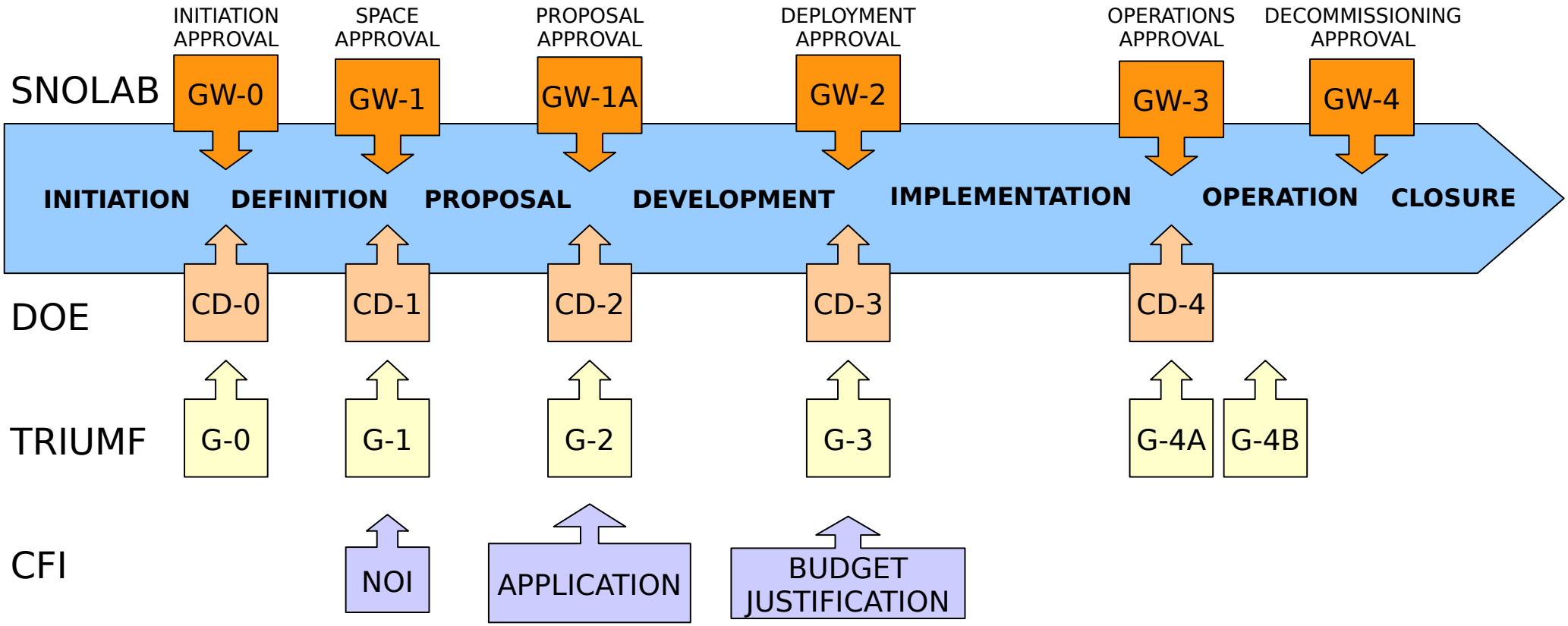


Programme Oversight

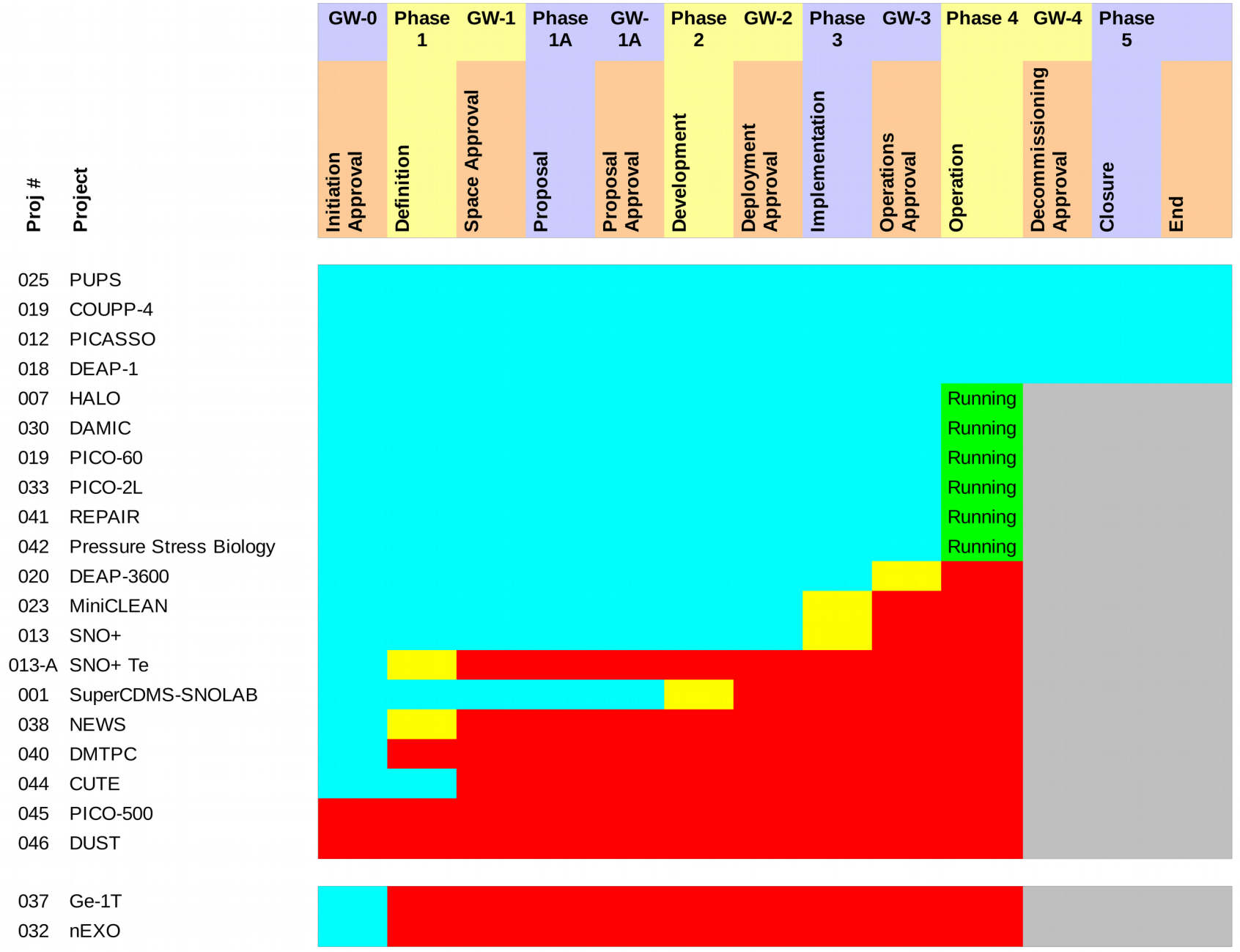
- To ensure scientific excellence, the science program is steered by an **Experiment Advisory Committee (EAC)** reporting to the SNOLAB Director. Chaired by Stewart Smith with international membership.
- To help ensure high-quality delivery, SNOLAB is in the process of obtaining ISO 9001 (Quality) and OHSAS 18001 (Health and Safety) accreditation.
- **SNOLAB Experiment Forum (SEF):** Forum of representatives from each active experiment and the facility. To ensure that we are meeting the collective needs of the experiment programme and to get feedback on the effectiveness of our processes. One instance identified by the SEF was the need to prioritize the Low Background Counting Lab.
- **Project Life Cycle** administered by the SNOLAB Projects Office.

Project Life Cycle

- Aligns with anticipated funding agency requirement to review financial and resource viability of Projects asking for CFI funding.
- CFI has mandated us to incorporate all existing Projects into the Life Cycle.



Project Tracking



Summary

- Facility has been in an 'Operations Mode' for several years now.
- Focusing on improving robustness and reliability of key systems.
- Experiment programme is steadily ramping up with two major Projects (DEAP-3600, MiniCLEAN) expected to begin data taking this year.

END